Appendix A
Vendor Claims

A.1 Introduction

Star Organics L.L.C.'s Soil Rescue technology is designed to stabilize toxic metals in soils, sludges, and other waste streams, permanently binding the metals and rendering them inactive or unleachable. The technology is applied as a fluid and utilizes one or more techniques depending on the medium being treated and the conditions required to achieve intimate contact of the fluid with the medium of concern.

A.2 Technology Overview

The technology utilized by Star Organics is chemical complexation, whereby unstabilized metals are bound in a multidentate coordination bond with phosphoryl organic compounds, thereby stabilizing the metal. The technology is not limited to RCRA metals, nor is it limited to soils as the current name of the product implies. It has been tested and found to be effective on metals of concern in the oil field, such as barium, and possibly sodium (more testing is being done as this is written). It has also been tested on antimony, thallium, selenium, arsenic (limited results to date), copper, zinc, and cadmium. The efficiency of the treatment varies depending on the target metal, competing metals, and pH of the medium to be treated. The technology can be applied to media such as wastewater treatment sludges, flyash, mine tailings, and municipal landfill leachates in addition to soils. The Company has also tested the technology on non-toxic metals related to agriculture, turf farms, and golf courses, utilizing the metal stabilization properties of the technology to reduce soil hardness and alkalinity which are known to retard the growth of crops, commercial turf, putting greens, and other vegetation.

A.3 Theory of Metals Complexation

The theory behind the Star Organics technology demonstrated in this SITE program evaluation pertains to the bonding relationships in metal complexes. Chemical elements interact to achieve low (stable) energy conditions when the physical and chemical environments (available complexing agents, pH, intimate contact) permit it.

A metal complex consists of a central ion and ligands. The central ion is a metallic cation (such as lead) about which a definite number of ions or molecules are attached in a preferred geometric arrangement. The molecules or ions attached to the central ion are called ligands. The ligands are classified as monodentate or polydentate, depending on the number of atoms in the ligand which are attached directly to the central atom.

Metal complexes can be formed by anions, some molecules, and very few cations. Star Organics manufactures an organic-based solution containing carboxylic acids and phosphoryl esters, among other compounds, which are known to have properties suitable for the formation of coordination covalent bonds characteristic of those formed in metal complexes.

A.4 Advantages of Star Organics' Remediation Technology

- In-situ application
- Low labor cost
- No concrete cost
- No incineration cost
- No offsite disposal cost
- No toxic reaction products
- No air pollution issues
- No volume increase when treating wastes
- Limited disposal concerns; disposable coveralls and shoe coverings of application personnel
- No special handling requirements; fluid is non-toxic and non-hazardous
- Few access limitations to the potential site since large dirt handling equipment is not required